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GEOLOGY.—*A mastodon skeleton near San Francisco Bay.*[1] ELIOT BLACKWELDER, Stanford University.

Well preserved remains of mastodons are sufficiently uncommon to merit the publication of definite records concerning them, especially when the geologic surroundings have been studied. In June, 1927, parts of a mastodon skeleton were discovered at the bottom of a pit that was being dug for a cistern about 2.3 miles west of Menlo Park station, which in turn is about 28 miles southeast of San Francisco. The bones which were recovered and are now in the museum of the Department of Geology at Stanford University consist of a molar tooth, three sections of a tusk and some fragments of ribs and other bones. A second tooth was found but was not given to the University. The enamel of the teeth was in such excellent condition that it was not even discolored, but the other bones were rather fragile. Although it is possible that the entire skeleton was present, the cost of digging it out would under the circumstances have been prohibitive.

The section exposed in the pit was as follows:

	Feet
6. Black clayey soil	4
5. Mottled drab and russet joint clay	11
4. Olive clay with many small chalky nodules	1
3. Olive-drab sandy clay	5
2. Coarse brown sand and very fine gravel; clean and free from iron oxide	1
1. Light green clay	1+

The bones were found embedded in the lowest layer of clay (1) and were partly covered by the sand (2). The impervious nature of the clay probably accounts for the good condition of the skeleton.

[1] Received December 5, 1928.

The location of this find is on a lot belonging to Mr. John Lebord, about one-half mile east of the intersection of the Woodside highway and the foothill road. It is in the plain formed by the coalescent alluvial fans that fringe San Francisco Bay. Physiographic evidence indicates that the entire deposit is of Recent and late Pleistocene age.

In this connection it may be of interest to recall that the depth and general position of the mastodon skeleton is about the same as that in which a human skull was found on the Stanford campus a few years previously.[2] The suggestion of contemporaneity is not to be lightly dismissed.

The tooth from this collection was submitted to Dr. W. D. Matthew, of the University of California, for examination. He found that it resembled rather closely the teeth of *Mastodon merriami* and *M. matthewi* Osborn—two species, of late Miocene and early Pliocene age, which have recently been segregated in a distinct genus, *Miomastodon*, by Dr. H. F. Osborn. As this genus is very imperfectly known the reference of the tooth to either of the above species can not be made with much confidence. The occurrence of the skeleton in the unconsolidated and entirely undeformed strata of the alluvial plain indicates strongly that the age is probably not greater than late Pleistocene. In that part of the California Coast Ranges all Pliocene formations have been strongly folded and faulted and even the early Pleistocene deposits have been disturbed and much eroded. The clear implication of the physiographic evidence is believed to be more significant in this case than the general resemblance of the teeth to those of a genus not yet known from post-Pliocene formations.

GEOLOGY.—*The Cretaceous section in Black Mesa, northeastern Arizona.*[1] JOHN B. REESIDE, JR. and ARTHUR A. BAKER, U. S. Geological Survey.

Black Mesa is an elevated area of Cretaceous rocks forming the central part of a well defined structural basin in northeastern Arizona. It constitutes a large part of the Hopi Indian Reservation in Navajo and Coconino Counties; on the northern and eastern sides it extends a short distance into the Navajo Reservation and therefore enters

[2] BAILEY WILLIS. *Out of the long Past.* Stanford Cardinal **32**: 8–11. 1922.

[1] Received December 18, 1928. Published with the permission of the Director, U. S. Geological Survey.

Apache County also. The geology of the mesa is of particular interest because it is one of the areas composing the westernmost line of deposits of the Cretaceous of the Interior Province. During the summer of 1928 the writers had opportunity to see much of the southern, and particularly the eastern and northern margins and were enabled to examine in some detail the section at the north end of the mesa just south of Kayenta. The previous reports on the geology of the mesa, briefly noted below, and our own observations justify the assumption that the results obtained on the northern margin will hold for the whole area. As they are somewhat at variance with the earlier views it has seemed worth while to record them.

Previous Observations

In 1861 Newberry[2] recorded the first description of the southern side of Black Mesa, assigning the lower [Dakota (?)] coal-bearing rocks to the Jurassic on the basis of the associated plant fossils and the overlying beds to the Cretaceous on the basis of both fossil invertebrates and plants. What seems to be the Mancos shale of later reports is assigned a thickness of 250 feet, and invertebrates are listed which would be called today *Prionotropis woolgari* Mantell, *Inoceramus labiatus* Schlotheim, and *Gryphaea newberryi* Stanton.

Howell[3] in 1875 also noted the section of coal-bearing rocks near the Hopi pueblos on the southern margin of Black Mesa, describing the succession as 100 to 300 feet of cream-colored sandstone and shale resting on 300 to 500 feet of dark shale, resting in its turn on soft white sandstones of Jurassic age.

In 1910 Darton[4] quoted brief descriptions from Newberry and Howell, and assigned the rocks of Black Mesa somewhat indefinitely to Dakota and later beds.

In 1911 Campbell and Gregory[5] compared the coal-bearing rocks of Black Mesa with those of the region near Gallup, New Mexico, and described them as including the Dakota sandstone and probably the Mesaverde formation, with a thin Mancos shale between. They

[2] J. S. Newberry. *Report upon the Colorado River of the West, explored in 1857–58 by Lieut. J. C. Ives. Pt. 3, Geological Report:* 82–83, 129–131. 1861.

[3] E. E. Howell. *Report on the geology of portions of Utah, Nevada, Arizona, and New Mexico.* U. S. Geogr. Geol. Surv. W. 100th Mer. **3**: 279. 1875.

[4] N. H. Darton. *A reconnaissance of parts of northwestern New Mexico and northern Arizona.* U. S. Geol. Surv. Bull. 435: 54. 1910.

[5] M. R. Campbell and H. E. Gregory. *The Black Mesa coal field, Arizona.* U. S. Geol. Surv. Bull. 431. 1911.

suggested that the Mancos shale owed its small thickness, as compared with the Mancos shale of San Juan Basin, either to actual lack of material or to a progressive change in the upper part whereby sandstones appeared westward at lower and lower horizons. The thickness of the so-called Dakota is given as from nothing to 70 feet, the Mancos shale as 300 feet, and the Mesaverde as probably not exceeding 500 feet.

In 1917 Gregory,[6] in a description of a large region including Black Mesa, added much detail, and interpreted the section in the mesa as containing Dakota sandstone, Mancos shale, and Mesaverde formation. The so-called Dakota sandstone was accepted as ranging in thickness from a few feet to 300 feet or more and containing, in addition to the usual sandstones, beds of conglomerate, shale, and impure coal. The greater thickness was found on the western side of the mesa. The Mancos shale was shown to have a thickness of from 490 to 620 feet where complete sections could be measured, the thickness increasing from southwest to northeast. The Mesaverde formation was shown to vary much in thickness, owing to the fact that it is the highest formation over much of the mesa and has been eroded to a varying degree. At the northeastern prominence, Yale Point, the formation included 745 feet of sandstone and shale, with coal in the lowermost part and again in a zone above the middle, and a marine horizon 200 feet above the base. This thickness is probably near the maximum remaining on the mesa. Fossils cited in the three formations: from the so-called Dakota, various plants; from the Mancos, *Exogyra laeviuscula* Roemer, *Ostrea* sp., *Inoceramus labiatus* Schlotheim in the lower part, and *Prionotropis* sp. near the middle; from the Mesaverde, *Ostrea pellucida* Meek and Hayden, *Inoceramus proximus* Tuomey, and *Gervillia*, said to be of Montana age, in the marine zone at Yale Point.

Darton[7] in 1925 accepted for the rocks of Black Mesa Gregory's classification as Dakota sandstone, Mancos shale, and Mesaverde formation, quoting from Gregory the data given.

Reagan[8] in 1925 gave a brief general discussion of the geology of Black Mesa and the surrounding region. For the Cretaceous he used

[6] H. E. Gregory. *Geology of the Navajo Country.* U. S. Geol. Surv. Prof. Paper 93: 68–79. 1917.

[7] N. H. Darton. *A resumé of Arizona geology.* Univ. Ariz. Bull. 119 (Geol. 3): 143–155. 1925.

[8] Albert B. Reagan. *Late Cretacic formations of Black Mesa, Arizona.* Pan-Amer. Geol. **44**: 285–294. 1925.

the following divisions, based apparently in large part on the section near Kayenta: Dakota sandstone, seldom exceeding 120 feet in thickness. Tununk shale and sandstone, probably exceeding 240 feet and containing *Gryphaea newberryi* Stanton and *Exogyra columbella* Meek. Mancos shale, equivalent to the part of the Mancos of other authors above the Tununk sandstone and exceeding 500 feet in thickness. Mesaverde sandstone, 350 feet thick and containing many thick seams of coal. Lewis or Masuk shale, 20 to 30 feet thick. Pictured Cliffs sandstone, 25 feet thick. Zilhlejini coal formation, 200 feet thick, bearing fresh and brackish water fossils and forming the surface rocks over much of the central part of the mesa. The fossils named are *Ostrea glabra* Meek and Hayden, *Ostrea soleniscus* Meek, and *Modiola laticostata* White. Reagan's Zilhlejini formation is overlain by shales and sandstones and with them was said to be a possible equivalent of the Fruitland and Kirtland formations of New Mexico. All the later rocks were spoken of as of Laramie age. In a later article[9] Reagan briefly described again the Mesaverde of Black Mesa and figured the three species found in his Zilhlejini formation. The present writers have examined the section near Kayenta and believe that in the lower part of his section Reagan has confused slumped materials with those in place and that his Tununk division does not exist. Between the Dakota(?) and the so-called Mesaverde there is only one shale body, as correctly described by Gregory[10] for the nearby Lolomai Point, in the lower part of which occur the fossils assigned by Reagan to his Tununk shale. The remainder of Reagan's section is considered in a later paragraph.

Section near Kayenta, Arizona

As just stated above, the writers examined the section, except for the uppermost part of the coal-bearing rocks, in the margin of Black Mesa, 4 miles south of Kayenta and 4 miles east of Lolomai Point. A number of collections of marine fossils were made that offer a check on the older collections from the Mancos shale, and one from the coal-bearing rocks that indicates a greater age than usually assigned to them. The thicknesses given are only approximate but the relative order of the beds is assured, as the rocks are completely exposed in a

[9] Albert B. Reagan. *Extension of Cretacic Laramie formation into Arizona.* Pan-Amer. Geol. **46**: 193–194. 1926.

[10] H. E. Gregory, *Op. cit.*, p. 74.

steep slope at the locality where the examination was made. The section with its fossils is as follows:

SECTION OF CRETACEOUS ROCKS IN BLACK MESA, 4 MILES SOUTH OF KAYENTA, ARIZONA

Mesaverde formation of previous reports:

Sheer wall of massive reddish-brown sandstone capping the edge of the mesa and visible for many miles along it 250

Gray to yellow sandstone with minor shale and coal beds, not examined in detail 350

Massive buff sandstone, medium grained; no fossils observed 50

Platy buff, fine grained, thin bedded sandstone and gray shale, forming a weak unit. The sandstone layers yielded *Inoceramus deformis* Meek, *I. undabundus* Meek, *I.* aff. *I. stantoni* Sokolow, *Ostrea congesta* Conrad, *Ostrea* sp., *Anomia subquadrata* Stanton, *Cardium pauperculum* Meek, *Tellina* cf. *T. subalata* Meek, *Legumen* sp. (n. sp.?), *Mactra* sp., *Dentalium* sp. (n. sp.?), *Turbonilla* cf. *T. coalvillensis* Meek, *Turitella* cf. *T. whitei* Stanton, *Baculites* cf. *B. codyensis* Reeside, *Placenticeras* aff. *P. pseudoplacenta* Hyatt 75

Grit and fine quartz conglomerate, gray to yellow, resting on an irregular base; no fossils observed 20

Coal in two thin beds in carbonaceous shale 40

Massive yellow sandstone; no fossils observed 50

Mancos shale of previous reports:

Interbedded light gray soft sandstone and sandy shale forming a transition zone; no fossils observed 100

Dark gray to black shale, much of it flaky; very thin, discontinuous calcareous fine grained brownish sandstones at a few horizons above the middle. A layer at 300 feet above the base of the unit contained an abundance of *Prionotropis woolgari* Mantell of Meek, and a few individuals of *Ostrea* sp., *Anomia?* sp., *Mactra?* sp., and fish scales; one 250 feet above the base, *Prionotropis woolgari;* and one 200 feet above the base, *Globigerina* sp 350

Light bluish-gray calcareous shale containing a few very thin bands of dark limestone; basal 10 feet sandy. At the top were found *Inoceramus labiatus* Schlotheim, *Ostrea* sp., *Globigerina* sp., and a large fish vertebra; at 120 feet above the base of the unit, *Ostrea* sp., *Inoceramus* sp., *Globigerina* sp., *Baculites gracilis* Shumard, *Metoiceras* sp.; at 20 feet above base, *Inoceramus labiatus* Schlotheim, *Ostrea* sp., fish scales; at 10 feet above base *Liopistha* (*Psilomya*) *concentrica* Stanton, *Gryphaea newberryi* Stanton; at the base of the unit, *Ostrea soleniscus* Meek and Hayden. *Inoceramus labiatus* was noted at many horizons in this unit but the crumbly shale matrix prevented collection 150

Interbedded thin, impure coal beds and gray sandy shale, a transition unit 10

Dakota (?) sandstone:

Brown to gray coarse sandstone above, coal and gray shale near middle, brown sandstone and conglomerate below 100

Morrison formation (McElmo of authors):

Gray-white to greenish-white sandstone and red and gray shales.

Age of the Deposits

The Dakota(?) sandstone of Black Mesa has yielded so few paleontologic data that one may say at best only that it is probably equivalent to the beds widespread in western Colorado, Utah, and western New Mexico, and now usually designated Dakota(?) sandstone to express the likelihood that it is not an exact equivalent of true Dakota sandstone and the possibility that part of it may be of Lower Cretaceous age and part of Upper Cretaceous age. There may also have been an interval between the deposition of these parts not now represented by sediments.

The shale which has been called Mancos contains an equivalent of the Benton shale only, and is but a small part of the typical Mancos shale of the northern San Juan Basin in Colorado. It is essentially the Turonian of the European classification. Fossils distinctive of the highest part of the Benton, such as *Prionocyclus wyomingensis* Meek and *Scaphites warreni* Meek and Hayden, were not observed by the writers and have not been reported by others, but this zone may well be represented by the relatively barren and probably nonmarine zone at the top of the shale and in the base of the overlying formation. The occurrence of *Ostrea soleniscus* Meek and Hayden and *Gryphaea newberryi* Stanton near the base of the so-called Mancos agrees with the known range of these species. *Exogyra laeviuscula* Roemer, reported in this zone by Gregory, is also in agreement. The presence of *Inoceramus labiatus* Schlotheim and *Metoicoceras* sp. at somewhat higher levels accords with their usual position and indicates that the lower fourth of the shale is equivalent to the Graneros shale and Greenhorn limestone of the Great Plains region east of the Rocky Mountains. A second fourth yielded no fossils. The zone containing *Prionotropis woolgari* (Mantell) of Meek, constituting the fourth above the middle, agrees with the lower part of the Carlile shale of the Plains (upper Benton), and, as noted above, there is still room for an equivalent of the remainder of the Carlile in the uppermost fourth. A shale formation corresponding closely in position and fauna to the so-called Mancos shale of Black Mesa is known in a belt that includes the Kaiparowits Plateau, the Colob Plateau, the western margin of the Wasatch Plateau, and the Coalville region of Utah.[11]

[11] E. M. Spieker and J. B. Reeside, Jr. *Upper Cretaceous shore-line in Utah.* Bull. Geol. Soc. Amer. 37: 429–438. 1926. G. B. Richardson. *The Upper Cretaceous section in the Colob Plateau, southwest Utah.* This Journ. 17: 464–475. 1927. H. E. Gregory and R. C. Moore. *The Kaiparowits Region.* U. S. Geol. Surv. Prof. Paper (In press).

The so-called Mesaverde formation has not yielded a large fauna. The fossils found by the writers in the 75-foot unit 110 feet above the base of the formation are of Niobrara age and the containing beds correspond to some part of the middle Mancos of San Juan Basin and are considerably older than the typical Mesaverde of the same Basin. They are Coniacian, in terms of the European classification. Gregory records from a similar horizon in his section at Yale Point[12] the Montana species *Ostrea pellucida* Meek and Hayden, *Inoceramus proximus* Tuomey, and *Gervillia* sp. It is the writers' belief that these are misidentifications of species belonging to the same fauna as those found near Kayenta. For the higher beds Reagan records, as noted in page 33, *Ostrea glabra* Meek and Hayden, *O. soleniscus* Meek, and *Modiola laticostata* White. *O. glabra* of Reagan is a simple type that might be a variant of the species to which it is assigned, but might equally well belong to some other simple species and means little for correlation. If the identification of *O. soleniscus* is valid, and the published figure certainly lends credibility to it, the containing beds (Zilhlejini formation of Reagan) are not younger than Niobrara, for the latest known occurrence of the species is with Niobrara forms in beds that correspond in position and fauna to the "Mesaverde" of Black Mesa. These beds, like the equivalent of the "Mancos," occur in the Kaiparowits Plateau, the Colob Plateau, etc. The writers suggest, though the published figure is not very clear, that Reagan's *Modiola laticostata* is *M. multilinigera* Meek of Colorado age. A collection made by Gregory (U. S. Geological Survey loc. no. 11642), labelled, "Chilchinbito, massive sandstone capping Black Mesa," and apparently not included in any published record, contains *Inoceramus stantoni* Sokolow, *Ostrea* sp., *Mactra* sp., and *Volutoderma* sp. (large, undescribed). This fauna, from the highest unit of our section and in or above Reagan's Zilhlejini formation, is of Niobrara age and would support the fossils reported by Reagan. It is the opinion of the writers, therefore, that not only the lower part of the so-called Mesaverde of Black Mesa but the upper part also is of Niobrara age, and that there is no warrant for correlating any part of it with the typical Mesaverde and later formations of San Juan Basin or with the units recognized in the Henry Mountains of southern Utah.

Conclusions

The Cretaceous section of Black Mesa resembles that of Kaiparowits Plateau, Colob Plateau, the western side of the Wasatch Plateau, and

[12] H. E. Gregory. *Op. cit.*, p. 78.

Coalville, Utah, rather than that of San Juan Basin or the Henry Mountains.

The lowest of the three major divisions, the Dakota (?) sandstone, is assignable only in a general way to a pre-Benton age.

The middle major division, the Mancos shale of previous reports, is of Benton age, and represents only a small part of the typical Mancos shale.

The highest major division, the Mesaverde formation of previous reports, is of Niobrara age, and represents a part of the typical Mancos shale, and is considerably older than any beds to which the name Mesaverde could be applied, even in an elastic usage of the term.

PALEOBOTANY.—*An* Anacardium *in the lower Eocene of Texas.*[1] EDWARD W. BERRY, Johns Hopkins University.

The genus *Anacardium* contains 8 or 10 species of shrubs and trees in the existing flora. Outside of cultivation these are confined to the American wet tropics. The leaves are rather characteristic and the fruits are exceedingly so.

Saporta, long ago, proposed a form genus, *Anacardites*, for fossil leaves supposed to belong to the family Anacardiaceae, but which could not be referred with certainty to any of the existing genera of the family. About a score of species have been referred to *Anacardites*, but these, with the single exception to be noted presently, resemble those of genera such as *Mangifera*, *Anaphremium*, and *Spondias*, and are not like the leaves of *Anacardium* itself.

The exception mentioned is *Anacardites balli* Berry[2] from the Jackson Eocene (Fayette sandstone) in Brazos and Grimes counties, Texas. Although it can not be conclusively demonstrated, I believe that this form is closely related to *Anacardium*, and this identification is rendered more probable by the discovery of the seed described below.

In 1924 I described the silicified fruits of an *Anacardium* from the Oligocene of Peru, and these are practically identical with the existing Cashew nut. They are present in great abundance associated with other fruits and seeds at a locality known as Belen, about 6 miles southeast of Puenta Pariñas, Department of Piura, Peru, and I had the pleasure of visiting the locality and making additional collections during the summer of 1927. The Peruvian material shows in an un-

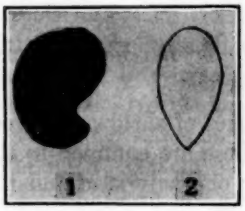
[1] Received November 23, 1928.

[2] E. W. BERRY. U. S. Geol. Surv. Prof. Paper 92: 177. *Pl. 62, fig. 7.* 1924.

mistakable manner the features of the nut (seed), the shell and its secretory lining.

At the time *Anacardium peruvianum* Berry[3] was described I had similar specimens from Colombia, but did not know the exact locality. This I now know was the valley of Santo Ecce Homo, near Leiva, Department of Boyacá, and from what Hettner called the Guaduas formation. The material was collected by Dr. M. A. Rollot of Bogotá, and is of great importance in evaluating the age of the extensive coal-bearing series of rocks in Colombia.

Recently Dr. George Sheppard of the Anglo-Ecuadorian Oilfields Limited, sent me a collection of fossil fruits from the Ancon Point sandstone of Santa Elena Peninsula, Ecuador. Among these are several specimens, not very well preserved but probably representing *Anacardium peruvianum*, as Dr. Sheppard recognized. The exact locality is Ida Seca, Ancon.[4]



Figs. 1, 2.—*Anacardium kirni* Berry, n. sp., Eocene of Texas.

A second fossil species of *Anacardium* fruit was described in 1924[5] from the middle Eocene between Arroyo Mancamajor and Ovejas, Department of Bolivar, Colombia. This is a much larger and otherwise different form from *Anacardium peruvianum*.

The preceding fossil species, like all of the Recent species, are from the American Equatorial region. This summer I received from Mr. Albert J. Kirn a collection of leaves and fruits from the lower Eocene (Wilcox) near Lytle, Atascosa County, Texas. Among these is a seed of *Anacardium*, and this may be named for the collector, and partially described as follows:

Anacardium kirni Berry, n. sp.

Seed unsymmetrically reniform in side view (Fig. 1) somewhat compressed, broadly rounded distad, narrowed and pointed proximad, somewhat bean shaped, but less symmetrical than any legume known to me. Length, 17 mm.; maximum width, 12 mm.; maximum thickness, 9 mm., decreasing proximad (Fig. 2). Surface smooth. Sinus about 4 mm. above the base. No trace of the seed coat.

As this species is based upon a single specimen it cannot be properly described, nor can the possible limits of variation be determined. In the

[3] E. W. Berry. Amer. Journ. Sci. **8**: 124. *Figs. 1–3.* 1924.
[4] Geo. Sheppard. Pan-Amer. Geol. **49**: 271–274. 1928.
[5] E. W. Berry. *Idem.* **42**: 261. *Figs. 1, 2.* 1924.

abundant material of *Anacardium peruvianum* there is a very considerable amount of variation in both size and shape, and some variants are not appreciably different from the present Wilcox species. However, it is highly improbable that a single botanical species ranged from Texas to Peru, and from the lower Eocene to the Oligocene, which is the main reason for describing the Texas form as a new species. It adds a strictly tropical element to the very extensive flora that is now known from the Wilcox Eocene, and marks the earliest known occurrence of the genus *Anacardium*.

PALEOBOTANY.—*Seeds of a new species of Vitaceae from the Wilcox Eocene of Texas.*[1] EDWARD W. BERRY, Johns Hopkins University.

In my summary account of the lower Eocene Wilcox flora, which will be published by the U. S. Geological Survey as Professional Paper 156, there are enumerated 43 orders, 82 families, 179 genera, and between five and six hundred species. Two representatives of the family Vitaceae, based upon leaf impressions, have been described as new species of *Cissites*—a form genus proposed by Oswald Heer in 1866 for fossil leaves of Vitaceae of undeterminable generic affinity.

In a collection of Wilcox fruits and leaves received recently from Mr. Albert J. Kirn, and coming from a locality near Lytle, Atascosa County, Texas, there is a well preserved seed which appears to me to be related to both the tropical genus *Ampelocissus*, and to the temperate genus *Vitis*. This is of unusual interest in the questions which it suggests regarding the relationship of *Ampelocissus* and other existing tropical genera of the family to the essentially north temperate genus *Vitis*, as well as the possible northern or equatorial origin of the family, and especially of its most useful member, the grape.

The new species may be named for the locality, and described as follows:

Ampelocissites lytlensis Berry, n. gen. and sp.

Seed relatively small, ovate in profile, broadly rounded distad, bluntly and obliquely pointed proximad, with an inflated crustaceous coat. Somewhat flattened in the region of the furrows which result from the conduplicate habit of the embryo. There is a fairly sharp keel between these furrows, and the furrows themselves diverge somewhat distad and extend for slightly more than half of the length of the seed. On the opposite side from the furrows there is a well marked central elongated depression containing the hilum. This depression is continued upward to the apex as a shallow furrow,

[1] Received December 17, 1928.

and downward as a narrower raphe groove to the base at the chalazal pointed end. The surface of the seed is not evenly rounded but is thrown into irregular obliquely transverse ridges, as in *Ampelocissus* and *Tetrastigma*. Length, 4 millimeters; maximum width, 3.5 millimeters; maximum thickness, 1.75 millimeters.

This seed differs from those of *Vitis* in the shorter and less prominent raphe; in the less prominent furrows; and in the transverse ornamentation—hinted at in the southern ancestor of *Vitis rotundifolia* Michaux. The fossil lacks also the cordate apex and the stipitate base of *Vitis*. It resembles the seeds of *Ampelocissus* in all of these features, and I therefore propose the generic term *Ampelocissites* for its reception, and regard it as intermediate between *Ampelocissus* and *Vitis*.

The existing genus *Ampelocissus* of Planchon contains about 60 species of the tropics of both hemispheres. It is largely Old World (Asia and Africa), but is represented in the Antilles and Central

Fig. 1.—Dorsal, ventral, and side views of *Ampelocissites lytlensis* Berry, twice nat. size.

America, being largely replaced in the occidental tropics by numerous species of the prolific tropical genus *Cissus*. The fact that *Ampelocissus* occurs on three continents is in itself an indication of its antiquity, and a characteristic seed indistinguishable from those of the existing species has been described by the writer from the Eogene of northwestern Peru.

The genus *Vitis*, with about two score existing species, is confined to the northern hemisphere, although it thrives in cultivation in antipodean regions both within and outside the equatorial zone. The genus *Tetrastigma* contains about 40 existing species of tropical and sub-tropical Asia, and Malaysia eastward as far as New Guinea. A fossil species has been recorded from the upper Eocene of southern England, but no traces of the genus have ever been discovered in the western hemisphere.

The family Vitaceae makes its appearance in the geological record in the uppermost stage (Albian) of the Lower Cretaceous on both sides of the Atlantic (Maryland and Portugal), and is common throughout the Upper Cretaceous. These early forms are based upon foliar remains and are usually referred to *Cissites*. Fossil leaves that have

been referred to *Vitis*, sometimes upon evidence that is far from conclusive, are found from the base of the Eocene throughout the Tertiary, and seeds occur as early as the upper Eocene.[2]

PALEOBOTANY.—*The genus* Amygdalus *in North America.*[1] EDWARD W. BERRY, Johns Hopkins University.

The genus *Amygdalus*, with about five natural species confined to Asia in the existing flora, and innumerable cultivated varieties in all warm temperate countries, is usually considered by botanists as never having been a member of the North American flora, although some students believe that the genus *Emplectocladus* of Torrey, with four or five shrubby species in the western interior from California, Utah, and northwestern Nevada to Mexico, is closely related to *Amygdalus*.

Much has been written regarding the place of origin and the history of cultivation of the peach, nectarine, and almond; and the prevailing opinion appears to be that enunciated by DeCandolle in 1855 and again in 1895, that the peach was a native of China, and the almond of western Asia (Syria and Anatolia), although it is quite possible that the latter is endemic in other Mediterranean countries, e.g., Greece and Algeria.

In view of the many similarities between the flora of eastern Asia and North America, now a somewhat threadbare subject as regards existing plants, there is no *a priori* reason why *Amygdalus* should not be found fossil in North America; in fact, as long ago as 1883 Lesquereux described what he called *Amygdalus gracilis*[2] from the upper Miocene of Florissant, Colorado, and this was also reported from the middle Eocene of Wyoming, and later from the Eocene of British Columbia. The name *gracilis* has reference to the leaves on which the species was primarily based, but these are not distinguishable from those of *Prunus*, which are not at all rare in the North American Tertiary. The two supposed fruits (figs. 14, 15) which Lesquereux thought might be associated with the leaves are very unconvincing. They might be what he thought them to be and they might be various

[2] M. E. J. CHANDLER. Palaeont. Soc. 1923: 32. *tf. 14; pl. 5, f. 4.* 1925.

[1] Received December 17, 1928.

[2] L. LESQUEREUX. *The Cretaceous and Tertiary floras.* Rept. U. S. Geol. Surv. Terr. 8: 199. *pl. 40., f. 12–15; pl. 44, f. 6.* 1883.

other things—they are certainly too indefinite to prove the presence of *Amygdalus* in North America.

Some years ago I encountered rugosely pitted stones similar to those of a small peach in the lower Eocene (Wilcox) of Tennessee and Arkansas. These, like the several species of *Amygdalus* stones described from the Tertiary of Europe, which they greatly resemble, are smaller than those of the existing cultivated forms. The Wilcox stones greatly resemble those of *Amygdalus platycarpa* (Decaisne) of China. This Wilcox species will be fully described and figured in a volume devoted to the Wilcox flora now in press.

Recently I received from E. E. Alexander of Spokane, Washington, a nearly complete specimen and counterpart of what I regard as a stone of *Amygdalus*, which may be fittingly named for the collector, and described as:

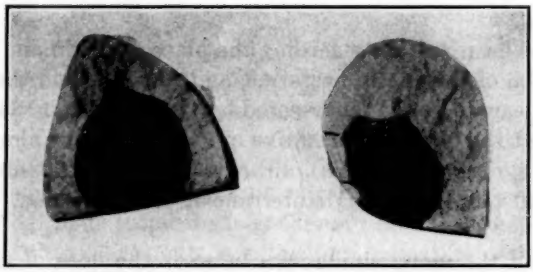


Fig. 1.—*Amygdalus alexanderi* Berry, n. sp., Miocene, Latah formation.

Amygdalus alexanderi Berry, n. sp.

Drupaceous stone, ligneous, ovate in outline, about 2 centimeters in length and 1.7 centimeters in maximum width as preserved in a crushed condition. The apparently rounded base is partly cut off by a joint in the clay matrix, and the apparently pointed apex is incomplete. The surface is strongly sculptured by a combination of relatively straight and sparingly branched ridges, less labyrinthine than in modern peach stones; and deep narrowly elliptical pits.

The stone was thoroughly rotten before it was finally covered by sediment, as is shown by the destruction of the original contour of the stone and by a slight overthrust from right to left seen down the middle of the face. The photograph of the counterpart shows a smooth marginal band in the upper left hand corner as though the specimen were a half of a stone and this were a part of the suture surface of the two halves. That the specimen does not represent a rugose capsule such, for example, as an unusually large *Fagus* capsule, which might be expected at this horizon, is clearly shown by the continuity of the surface in the above mentioned fold. Leaves which have

been referred to *Prunus* are not uncommon in the Latah flora, and it is possible that these leaves belonged to the same plant which bore these stones.

Although differing slightly from modern peach stones in the sub-parallel arrangement of the ridges and pits, I regard it as conclusive evidence of the presence of *Amygdalus* in the Miocene of western North America. The horizon is the Latah formation, and the exact locality is the Brickyard exposure in the city of Spokane.

If this and the Eocene species referred to are correctly determined, they mean that *Amygdalus* occurred in the western hemisphere quite as early as any that are known from the Old World, and that they were essentially southern or warm temperate in origin. It means further that peaches were probably an element in the North American flora from the Eocene throughout the greater part of the Tertiary, and that the late Miocene form of Washington was not an immigrant from Asia, but a survivor of the American stock in the far northwest, whose extinction during the climatic changes due to the elevation of the Coast ranges is easy to understand.

It is significant that a great many of the elements associated with *Amygdalus alexanderi* in the Latah flora survive to-day in only the Asiatic region (*Paliurus, Glyptostrobus,* etc.), or in the mesophytic region of southeastern North America (*Taxodium, Comptonia, Hydrangea,* etc.), or in both regions (*Hicoria, Liriodendron, Sassafras, Fagus, Ulmus, Castanea, Tilia, Magnolia, Liquidambar, Diospyros,* etc.), and only a few maintain a precarious existence in restricted relict environments in the west (*Juglans, Platanus, Aesculus,* etc.). All of the few examples mentioned have a long antecedent American history. *Amygdalus* thus parallels *Paliurus* and *Glyptostrobus,* with which it is associated both in the lower Eocene and Miocene.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE ENTOMOLOGICAL SOCIETY

400TH MEETING

The 400th regular meeting was held March 1, 1928, in Room 43 of the National Museum. The president, S. A. ROHWER, presided.

The president announced that he had recently appointed a committee on communications, consisting of Dr. T. E. SNYDER, Chairman, Drs. N. E. MCINDOO, and C. A. WEIGEL. The programs had previously been arranged by the Corresponding Secretary, with the assistance of other members.

Program: Dr. THOS. E. SNYDER: *A visit to Hawaii.* At the invitation of the Board of Commissioners of Agriculture and Forestry of Hawaii, the

speaker visited Honolulu to cooperate with territorial entomologists in attempts to control termites. The beauty of Honolulu, on the Island of Oahu, the hospitality of the inhabitants, and the fauna and flora were briefly discussed. The work of the Territorial and Federal entomologists, as well as those of the Sugar Planters Experiment Station and the Pineapple Growers Experiment Station, was outlined with particular reference to investigations of termites. Termites have been recorded from the Hawaiian Islands since 1883, but about fifteen years ago *Coptotermes formosanus* Schiraki was introduced from the Orient. This species is spreading rapidly and has become very destructive to the woodwork of buildings. The campaign being waged against this subterranean or ground-nesting termite and against the earlier introduced injurious dry-wood termite, *Cryptotermes piceatus* Snyder, is conducted along two lines: (1) Offensive warfare consisting of poisoning the termites in soil or wood by the use of carbon bisulphid gas and dry Paris green; and (2) Defensive warfare by proper methods of construction of buildings to prevent attack by termites. It is proposed to include in the building code provisions to prevent termite attack. In the office of the territorial entomologist is a large map on which the spread of the ground-nesting termite is plotted. This termite is the more injurious, since the dry-wood termite, though more widespread, does not so seriously weaken the woodwork of buildings. The recommended provisions will increase the initial cost of a building 2 per cent; more stringent recommendations, increasing the initial cost 10 per cent, are not considered advisable for a mandatory building code. The excellent educational work being done by Mr. Alexander Hume Ford, Director of the Mid-Pacific Science Institute, was also briefly described. (*Author's abstract*).

Discussed by BACK, ELY, GRAF, and MCINDOO.

E. R. SASSCER: *Some problems in the enforcement of foreign plant quarantines.* The speaker discussed problems in connection with the enforcement of foreign plant quarantines at maritime and Mexican border ports of entry.

Discussed by MCINDOO.

C. P. CLAUSEN spoke briefly on the life history and biology of some parasitic Hymenoptera.

C. T. GREENE, *Recording Secretary, pro tem.*

401ST MEETING

The 401st regular meeting was held April 5, 1928, in Room 43 of the National Museum. The president, S. A. ROHWER, presided.

OSCAR WHITAKER, of Halliburn, British Columbia, was elected to membership.

The Executive Committee recommended that the Society contribute $125.00 to the fund for the entertainment of foreign visitors to the Fourth International Entomological Congress to be held at Ithaca in August, 1928, this sum to be obtained by contributions from the local members of the Society.

Program: MAX KISLIUK, JR.: *Experiences in Argentina, Spain, and the Canary Islands in connection with fruit-fly surveys.* A general idea of the agricultural conditions, especially in regard to water, soil, elevation, and weather, in the fruit-growing zones in these countries was presented. In Argentina the speaker found *Anastrepha fraterculus* Wied on the wing, resting on fruit, and the larvae in various fruits in the Provinces of Tucuman and La Rioja. *Ceratitis capitata* Wied larvae were found in grapes in the Province of La Rioja. After finding *Ceratitis capitata* in nearly ripe Almeria grapes in Spain's two most important

grape-growing zones, Dalias and Berja, he proceeded to survey seven other Almeria grape sections, where he was told that for various reasons—freezing winter temperatures, high altitudes (up to 3,500 feet above sea level), lack of other fruit hosts, etc.—he would not find the grapes infested. He found these sections infested, however, and proved his findings to the satisfaction of the Spanish authorities. Although the Mediterranean fruit fly is more abundant on the Canary Islands than at any other section previously inspected, there was no infestation by this pest in tomatoes, here or in Spain. Among the many lantern slides shown was one picturing the vineyard where originated the infested grapes intercepted in New York in 1926, and where he now found the Mediterranean fruit fly. Slides showing various vineyard conditions, hauling, selecting, packing, and shipping were shown. Among these were some picturing growing conditions for tomatoes, bananas, onions, and the cactus for cochineal on the Islands.

F. C. BISHOPP: *Fighting insects on the great ranches of the Southwest.* Range conditions and practices employed in the Southwest, and the outstanding problems in which the entomologist is interested were outlined. The accomplishments of the Department in controlling some of the external parasites of live stock, such as the cattle-tick and the scab-mites of cattle and sheep, were described, and also the experimental work which the Bureau of Entomology is carrying on in Texas. The importance of developing effective control measures against goat lice, horse flies, and other insects affecting live stock, was discussed, and also the extensive range operations, particularly trapping, which are employed in combatting the screw worm. A number of lantern slides were shown.

Among the visitors present at the meeting were Dr. BERNARD TROUVELOT of Station Entomologique, Paris, France, and Dr. JEAN DUFRENOY, phytopathologist, also of Paris, France, who, on introduction by the President, greeted the assembled members.

402D MEETING

The 402nd regular meeting was held May 3, 1928, in Room 43 of the National Museum. The President, S. A. ROHWER, presided.

The Treasurer reported that 25 members had already contributed to the Society's donation to the local committee in charge of the Fourth International Entomological Congress and that contributions received to date total approximately $125, the amount asked for.

Program: DR. J. R. CHRISTIE: *Some aspects of the interrelationship of insects and nemas.* The rôle of insects as vectors or mechanical carriers of nemas was briefly discussed. The unique cyst-forming nema, *Rhabditis coarctata* and the insect-dispersed "red-ring" disease of the cocoanut palm caused by *Aphelenchus cocophilus* were among the examples noted of this type of relationship. Brief mention was made of the rôle of insects as secondary hosts of parasitic nemas belonging to the families Filariidae and Spiruridae. Principal emphasis was placed on the rôle of insects as primary hosts and the pathological conditions which result from this type of parasitism. In this connection comment was made on *Howardula benigna*, a nemic parasite of various species of *Diabrotica*. The economic importance of the Mermithidae was discussed, the discussion being based largely on the results of investigations by the speaker on *Mermis subnigrescens* and *Agamermis decaudata*, parasites of grasshoppers.

Discussed by HOWARD, MCINDOO, GRAF, ALDRICH, CAMPBELL, EWING, and HYSLOP.

Dr. G. F. WHITE: *The disease problem in entomology.* Diseases of insects are an extremely important natural factor in the control of a number of injurious species, as is shown by the enormous mortality which is continually being observed among them. Insects being animals, their diseases might be expected to be, and indeed have been found to be, fundamentally similar to those affecting man and other animals. In a study of the insect diseases, therefore, the pathologist is confronted with problems similar to those encountered in the study of human and other animal diseases. The training necessary for the successful study of insect diseases is similar to that of the human and comparative pathologists. Fungus, bacterial, helminthic, protozoan, and filterable-virus diseases occur among insects. Each of these groups of diseases is fundamentally similar to a parasitism of insects where an insect is the parasite. In an effort at artificial control of an insect pest by means of its diseases, results of the same general character may be expected as are being obtained through insect parasitism. When the maximum number of environmental factors available is employed in control work, the fungi, the bacteria, the helminths, the protozoa, and the filterable viruses will be included. An enormous and extremely important field for research is the study of the transmission of the diseases of man, of other animals, and of plants, by insects. Entomologists have a further contact with disease problems in the injuries done directly by insects to man, other animals, and plants.

403D MEETING

The 403d regular meeting was held June 7, 1928, in Room 43 of the National Museum. President S. A. ROHWER presided.

Mr. Rohwer stated that somewhat more than the amount pledged by the Society for the entertainment of foreign visitors in attendance at the 4th International Congress of Entomology held at Ithaca, had already been received. It was expected that the visitors would come to Washington, and that the Society would desire to provide some entertainment for them, and he recommended that the amount over and above the pledge be made available for any expenses connected with such entertainment. The tentative program included a visit to Plummers Island, and it had been suggested that a special meeting of the Society be called and an informal smoker also be arranged.

Program: R. A. CUSHMAN: *The C. F. Baker Collection.* Mr. Cushman's talk, illustrated by lantern slides, was largely a description of the methods of packing the Baker Collection and its transportation from Los Banos, P. I., to Washington. He prefaced his remarks by a brief statement of the work and character of Professor Baker.

Discussed by ROHWER, who commented on the good condition in which the collection arrived at the Museum and on the general nature of its contents; by ALDRICH, who spoke of his personal association with Prof. Baker years ago in the West, notably in Colorado; and by GRAF, who gave some impressions of Prof. Baker while a student under him for 2 years.

Dr. MCINDOO gave a brief review of some recent entomological literature.

DR. ALDRICH gave a brief review of the newly issued 185th fascicle of *"Genera Insectorum,"* this being a work on the Empididae by Dr. Melander, who has devoted a considerable portion of his time since 1900 to its preparation.

SPECIAL MEETING

Following the adjournment of the Fourth International Congress of Entomology at Ithaca, N. Y., August 18, many of the foreign delegates came directly or indirectly to Washington, where a special meeting of the Entomological Society of Washington was held in their honor. The meeting was held August 21, 1928, in the Assembly Hall of the Cosmos Club and was attended by about 200 persons.

President S. A. ROHWER made a brief address of welcome and introduced as chairman of the meeting Dr. C. L. MARLATT, Chief of the Bureau of Entomology and an ex-president of the Society. Dr. MARLATT welcomed the guests, and told briefly of the social side of the earlier meetings of the Society. He suggested that, this being a meeting of a local society and not connected with the Congress, probably no better plan could be adopted than to discuss the entomological societies of the world. As so many of these societies were represented at the meeting, such a discussion should prove illuminating. He called attention to the fact that the two oldest of the world's entomological societies were represented by Prof. E. L. Bouvier, Honorary President of the Société entomologique de France, and by Mr. J. E. Collin, President of the Entomological Society of London. Each of the following visitors spoke about the entomological society to which he belonged and which he had, officially or unofficially, represented at the International Congress: FRANZ HEIKERTINGER, Zool.-bot. Gesellsch., Vienna, Austria. ANTOINE BALL, Mus. Roy. Hist. Nat., Brussels, Belgium. KAI LUDVIG HENRIKSEN, Zool. Mus. Copenhagen, Denmark. JAMES E. COLLIN, Ent. Soc. London, England. HASSAN C. BEY EFFLATOUN, Plant Prot. Sect. Min. Agric., Cairo, Egypt. Dr. EDOARDO GRIDELLI, Mus. Civ. Stor. Nat., Genoa, Italy. Dr. ELISABETH SKWARRA, Univ. Königsberg, Königsberg, Germany. Dr. UNIO SAALAS, Univ. Helsinki, Helsingfors, Finland. Dr. CANDIDO BOLIVAR Y PIELTAIN, Mus. Nac. cienc. nat., Madrid, Spain. Dr. N. A. KEMNER, Ent. Føren., Stockholm, Sweden. Dr. ALFONS DAMPF, Mexico, D. F., Mexico. Dr. N. M. RIMSKY-KORSAKOV, Forst. Inst. Univ., Leningrad, Russia. Prof. RYSZARD BLEDOWSKI, Univ. of Warsaw, Warsaw, Poland. W. J. J. ROEPKE, Landbouwhoogeschool, Wageningen, Holland. Dr. E. L. BOUVIER, Mus. Hist. Nat., Paris, France. Dr. FRITZ STELLWAAG, Zool. Stat. Weinbauversuchsanst., Neudstadt, Germany. Dr. JAMES WATERSTON, British Museum, London, England. Prof. FILIPPO SILVESTRI, R. Ist. Sup. Agr., Portici, Italy. R. G. JEANNEL, Mus. Hist. Nat., Paris, France.

Dr. MARLATT, after Dr. BOLIVAR had spoken, called upon Dr. C. W. STILES, of the U. S. Public Health Service, and Dr. W. M. MANN, Director of the U. S. Zoological Park, to speak briefly, and after Dr. DAMPF of Mexico had spoken, he introduced Dr. ALEXANDER WETMORE, of the U. S. National Museum, who gave friendly greetings to the delegates. Prof. E. L. Bouvier, of Paris, announced that, on the authorization of his government, he and the French delegation had that day presented to Dr. L. O. HOWARD the cross of Officer of the Legion of Honor. Dr. MARLATT then called upon Dr. HOWARD to say a few words. A fine spirit of enthusiasm prevailed at the meeting. The older members of the Society remarked that it was probably the largest meeting of the Entomological Society of Washington that had been held in the course of its forty-four years of existence.

After adjournment a buffet supper was held in the lobby.

404TH MEETING

The 404th regular meeting was held October 4, 1928, in Room 43 of the National Museum. President ROHWER presided.

Dr. VASCO M. TANNER, Brigham Young University, Provo, Utah, was elected to membership.

Mr. ROHWER stated that in accordance with the plans made by the Society to contribute $125 to help defray the cost of entertainment of the foreign visitors at the Fourth International Congress of Entomologists held at Ithaca, the Treasurer had forwarded to the Chairman of the local committee the amount which the Society had promised. The Society had authorized entertainment for the foreign delegates who visited Washington after attending the International Congress, and now it was necessary for the Society to pay the expenses incurred by the executive committee for entertaining these visitors. An assessment of $2.00 had been levied upon local members, but this amount would not be adequate and it was hoped that the necessary balance of the $240 would be secured by special donations from the members. He urged that the local members give this matter early consideration, since the obligations had been incurred by individuals rather than in the name of the Society, and some of the bills had been paid by the men assuming the responsibility.

The Chair announced the death of Dr. Jean Brethes, one of the better known entomologists from South America, who had been particularly interested in the taxonomic phases of entomology and who had devoted considerable attention to the classification of Hymenoptera and Diptera. Dr. Brethes died at Buenos Aires, July 2.

Program: AUSTIN H. CLARK. *Butterflies of the District of Columbia.* There are 86 species of butterflies known from the District of Columbia. One species, *Catopsilia sennae*, which is not infrequent in late summer is represented here by males only. Two others, *Danaus menippe* and *Cynthia cardui*, usually common in the summer, do not survive the winter but the District is restocked each spring by individuals apparently coming from nearer the sea. The speaker called attention to the large dark short-winged form of *Junonia coena* which is confined to bogs and is very local, designating it as the "wet" form. He showed a comparable "wet" form of *Cynthia atalanta*. Neither of these "wet" forms survive the winter, spring individuals being of the usual "dry" form only. In the District *Cynthia cardui* is represented only by the "wet" form, excepting in early spring when occasional specimens of the small dull "dry" form may sometimes be seen near the river. Apparently these wander in nearly every year. The dark shortwinged summer individuals of *Polygonia interrogationis* and *P. comma* are simply "wet" forms of those species. (*Author's abstract.*)

Discussed by ROHWER, MCINDOO, HOWARD, ELY, and BRIDWELL.

H. S. BARBER: *Cave and other subterranean beetles.* Interest in subterranean beetles has been revived by the recent visits of certain European students, Drs. Jeannel, Bolivar, and Rambusek. That hardly twenty-five blind subterranean species are known from America in contrast with perhaps 500 from Europe may indicate either neglect on our part or a very interesting problem in zoogeography. It is hoped that greater interest in the investigation of this fauna may be developed in America. Most insects normally are sheltered in the ground for part of their lives and pressure of adverse surface environment, or peculiar fitness to life in the holes left in the subsoil by worms, decaying roots, rock crevices, or the burrows of large animals, may have

shortened their periods of surface activity until they no longer appeared above ground. Reduction of pigment, wings, eyes, etc., would naturally follow, accompanied by development of compensatory adaptations. *Anillus* was cited as an example of the minute, blind, wingless beetles probably inhabiting the soil throughout most of the United States, although recorded only from the Appalachians, Florida, Indiana, Texas, and California. It can be found under stones in early spring, but special methods of search can be developed for collecting it and those species which live similarly. *Rhadine* is an example of the local specialization from the ubiquitous, light-loving genus *Plantynus* to the eyeless and otherwise highly specialized cavernicole described as *Comstockia subterranea*, and the numerous species form a somewhat regular series grading from habitation under stones in loose rock-falls from cliffs, or in burrows of animals, to complete adaptation to life in great caverns. Our few species of the much discussed genus *Anophthalmus* are, according to Jeannel 1920 (Bull. Soc. Ent. France, 1920, p. 152), distinct genera from the cavernicolous species of Europe and are survivals of an old light-loving fauna which is now known as represented only by a species in Japan, and another in Northern Europe. As our species are known only from a relatively few caves east of the Mississippi and south of the margin of the Illinoian and Wisconsin glacial drift, and as multitudes of caves are known in other regions, numerous new species may be expected. The speakers' experience in seeing seven specimens in more than twenty visits to caves contrasts strongly with his capture of a hundred specimens in traps set in a few caves and twice examined. (*Author's abstract.*)

Discussed by MANN, MCINDOO, HOWARD, BRIDWELL, and EWING.

Dr. FRANK E. BLAISDELL, SR., of San Francisco, Cal. expressed his pleasure at the opportunity of being with us, and gave some reminiscences of previous visits to the museums of Washington and other eastern cities. He also gave a brief review of some of his work on various genera of Tenebrionidae, notably *Eleodes* and *Blapstinus*, and mentioned the work of Colonel Casey on this family. He stressed the value of obtaining detailed data on life history and the desirability of having on file an extensive series of immature stages of the insects for study. At the suggestion of Dr. HOWARD, he was requested by the Society to convey our greetings as a Society to our colleagues on the Pacific Coast.

A. B. GAHAN read extracts from a letter recently received from Alan P. Dodd, Brisbane, Australia, discussing work of the Commonwealth Prickly Pear Board, and reporting that parasites are not making much headway in attacking the *Cactoblastis* now working in prickly pear. "There is every reason to believe that *Cactoblastis* will solve the prickly pear problem in a few years; its rate of increase in the field is enormous and the destructive results are quite extraordinary."

A. H. CLARK read a letter from Greenfield, Mass., to Mr. Thornton W. Burgess transmitting a number of insects which were determined by Mr. A. N. Caudell as the European house cricket (*Gryllis domestica*). They were said in the letter to be exceedingly numerous in the houses at Greenfield. This is the first record for Massachusetts.

J. C. BRIDWELL reported recent collection near Barcroft, Virginia, of the imported willow-leaf beetle, *Plagiodera versicolora* Laith. Discussed by ROHWER.

J. S. WADE, *Recording Secretary.*

THE GEOLOGICAL SOCIETY

443D MEETING

The 443d meeting was held at the Cosmos Club November 14, 1928, President Hewett presiding.

Informal communications: N. H. DARTON exhibited a new geologic map of New Mexico and a photograph of an unpublished relief map of New Mexico by Mr. Renshaw. Discussed by Messrs. STOSE and CAMPBELL.

W. C. ALDEN showed views of a part of Glacier National Park that has recently been made accessible.

Program: C. P. ROSS: *Early Pleistocene glaciation in Idaho.* On and near Railroad Ridge, Custer County, Idaho, there are deposits of unconsolidated detritus, believed to be of glacial origin, which are out of harmony with the present topography. The evidence points to the detritus being the product of glaciation in early Pleistocene, possibly Nebraskan, time, and indicates that at that time the country was far less rugged than at present. Valley cutting of the order of 1,400 feet took place in the interval between this early glaciation and Wisconsin time, when the cirques and U-shaped valleys which are prominent features of the present topography were formed. This is in marked contrast to the erosion of 100 feet and less which has occurred in Recent time.

Similar, though less complete, evidence of ancient glaciation followed by deep erosion is known on Loon Creek farther north, and on Little Wood River farther south. All three localities are close to the highest peaks in Idaho. Evidence of similar conditions in the Pleistocene has been found by other investigators in Montana, Wyoming, and perhaps Washington. While two widely separated periods of glaciation are known in northern Idaho, neither appears to be as old as that here described.

Discussed by Messrs. CAMPBELL, MENDENHALL, CAPPS, FERGUSON, ALDEN.

M. R. CAMPBELL: *Value of river gravels in the study of deformation.* Discussed by Mr. STOSE.

E. O. ULRICH: *Paleogeographic data developed in the study of lower Paleozoic stratigraphy in Oklahoma.* Discussed by Mr. BASSLER.

444TH MEETING

The 444th meeting was held at the Cosmos Club November 28, 1928, President Hewett presiding.

The Secretary announced the deaths of J. S. DILLER and T. C. CHAMBERLIN.

Program: LÉON W. COLLET, Professor of Geology, University of Geneva, Switzerland, and Harvard University: *Origin of the lakes of the Swiss Alps.*

Discussed by Messrs. STOSE and MENDENHALL.

445TH MEETING

The 445th meeting was held at the Cosmos Club December 12, 1928, President Hewett presiding. Vice-President G. R. Mansfield took the chair during the presentation of the address of the retiring President.

Presidential address: A review of European metal production.

36TH ANNUAL MEETING

The 36 annual meeting was held at the Cosmos Club after the adjournment of the 445th regular meeting, President Hewett presiding.

The annual report of the Secretaries was read. The Treasurer presented his annual report showing an excess of assets over liabilities of $1142.56 on December 12, 1928. The auditing committee reported that the books of the Treasurer were correct.

The results of balloting for officers for the ensuing year were as follows: *President:* S. R. CAPPS; *Vice-Presidents:* G. R. MANSFIELD, O. E. MEINZER; *Treasurer:* H. G. FERGUSON; *Secretaries:* A. A. BAKER, JAMES GILLULY; *Members-at-large of the Council:* N. L. BOWEN, H. D. MISER, H. N. SHORT, W. D. COLLINS, J. B. MERTIE, JR.; *Nominee as Vice-President of Washington Academy of Sciences representing the Geological Society:* D. F. HEWETT.

W. W. RUBEY, A. A. BAKER, *Secretaries.*

SCIENTIFIC NOTES AND NEWS

A. A. STOYANOFF, Professor of Paleontology at the University of Arizona spent several days during the first week of January at the National Museum comparing fossils from the early Paleozoic of Arizona with material in the Museum's collections.

Professor and Mrs. CARROL LANE FENTON recently visited the National Museum to study collections of Devonian brachiopods from Iowa in connection with their work on the development of these forms.

Dr. CHARLES RYNYKER, paleontologist with the Gypsy Oil Company at Tulsa, Oklahoma, visited the National Museum to examine microfossils.

Obituary

SEBASTIAN JACOB MAUCHLY, a member of the ACADEMY and a former editor of this Journal, died December 24, 1928, at his home in Chevy Chase, Maryland, after a long illness. Dr. Mauchly was born in 1878 at Swanton, Ohio, studied at Ohio State University and University of Chicago, and as Hanna research fellow received the degree of doctor of philosophy from the University of Cincinnati in 1913. As physicist with the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, he specialized in terrestrial electricity and as chief of the Section of Terrestrial Electricity of the Department was responsible for the development and improvement of many instruments for observing the electric elements at field and observatory stations. He made numerous valuable contributions to this branch of science and was first to call attention to the apparent universal twenty-four hour term in the diurnal variation of the Earth's electric field. This fundamental result was deduced by him largely from his discussions of the work at sea by the CARNEGIE and he later corroborated this conclusion by extensive investigations of results at land stations over the entire globe.

ERICH P. BECHER, Ordinarius Professor of Philosophy at the University of Munich and a member of the ACADEMY, died recently at the age of 46. Professor Becher was in charge of the Psychological Institute of the University and was known for his work in natural philosophy, psychology, and ethics.